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Current Anesthesia Education Practices Regarding Music as
an Adjunct for Analgesia and Anxiolysis

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Abstract

Background: Music has been proven as an effective complementary and alternative medicine, and can be an important tool for nurse anesthetist.

Objectives: The purpose of this project was to assess if nurse anesthesia programs are including music as a part of the complementary and alternative medicine (CAM) curriculum for anxiety and pain in the perioperative setting.

Method: A descriptive survey was sent to program directors of nurse anesthesia programs in the United States to assess the current level of awareness and education regarding music as an alternative medicine as well as barriers to the addition of music into curriculum.

Results: Twenty-eight participants responded to the survey. A Chi squared test revealed that a statistically significant link ($p = 0.003$) between program Doctoral degree level and the program director or director's proxies' likelihood to know the benefits of music as a CAM. Additionally, the most common response to barriers for music as a CAM addition to curriculum was lack of time and lack of CAM on boards.

Conclusions: The project found that there are CRNA programs that know the benefits of and teach music as a CAM as a part of their curriculum. The project also showed there is a need to expand music as a CAM education to increase both student and current provider awareness of benefits as well as utilization.

Key Words: Music, anesthesia, anxiety, pain, CAM, Complementary and alternative medicine.

Chapter 1: Introduction

Introduction

There is evidence of music existing in medicine as far back as prehistoric Shamans usage of drums in healing rituals but was not a recognized specialty until the late 20th Century (Horden, 2000). Links between music and psychology go as far back as Pythagoras who believed that daily singing and playing helped achieve emotional catharsis and that with a regular routine of music, health would be achieved. (Lee, 1989, p.1) This Pythagorean belief was the very beginning of a continual usage of music and its psychological effects.

Studies examining the use and effects of music in medicine were not widely conducted until the 1980s, but those studies have shown consistently positive results for patient outcomes. In modern medicine, music can be used in various ways such as creating music, dancing to music, or listening to music across many disciplines including physical therapy, occupational therapy, pain therapy, and stress and anxiety management. Music can be used in so many aspects of health due to its ability to stimulate both hemispheres of the brain. In the right hemisphere the effects of music are seen, while the left hemisphere processes and interprets music (DevarePhadke, Phadke, & Yardi, 2014). For most people, music is processed in the temporal lobe and auditory cortex with the modulation, or experience, processed in the right brain (Trangeberg and Stomberg, 2013). The right brain is also responsible for the modulation of production of endorphins, which may explain the reduction in pain experienced during music therapy (Trangeberg & Stomberg, 2013).

Nursing's utilization of music in health care is a relatively new concept with the primary focus mostly in pain and anxiety capacities. Building on the research from psychology and medicine, nursing continues to ascertain when, how much, how often, and what kind of music should be used to improve health and maintain health. Most studies involving music in health are

from the medical perspective, particularly with restorative therapies. Vaajoki, Pietila, Kankkunen, and Vehvilainen-Julkunen (2013) conducted a larger scale study over the course of 25 months and found overall positive effects of using music to treat pain and elevate mood. This study did note that interruptions from rounding of doctors and nurses, phone calls, and visitors may skew some of the data. This study cannot be generalized due to being conducted at a single hospital, but does have results consistent with studies from other disciplines.

Problem Statement

Anesthesia providers often rely solely on pharmaceutical interventions for pain and anxiety. While pharmaceutical therapy offers patients relief it can have adverse outcomes such as possible allergy, symbiotic drug effects, over sedation, and depressed respiratory drive. Music has consistently been shown to be beneficial for patients across disciplines without adverse effect. Consolidating this large body of evidence, the omission of music as a routine part of a multimodal plan for pain and anxiety in the perioperative setting, raises questions as to where research does not align with practice. When looking at how or why practitioners choose what to include as a part of their personal practice, it is important to include and examine the foundational anesthesia knowledge from educational exposure and work forward from that point.

Purpose of the Study

The purpose of this project was to evaluate if music is currently included in nurse anesthesia program curriculums as an adjunctive therapy for pain and anxiety. Additionally, if music is not included, what barriers exist towards its inclusion. A needs assessment of nurse anesthesia programs current complementary and alternative medicine (CAM) curriculum was utilized to answer the question of, if the gap between current research and practice is at the level of education or the level of application.

Clinical Question

- Is music routinely included into nurse anesthesia programs as CAM for pain and anxiety, and if music is not included what barriers exist to implementation?

Theoretical Framework

The theoretical frame of this project was based on Promoting Action on Research Implementation in Health Services (PARIHS). First published in 1998 PARIHS was created by Kitson, Harvey, and McCormack and is best described as a process for implementation or evidence based practice change (Hutchinson, Wilson, Kent, & Harrison, 2011). The three main elements of PARIHS are: evidence, context, and facilitation.

To be successful in implementation there must be clarity of the evidence to be used, the quality of the context, and the type of facilitation that would ensure successful change (Rycroft-Malone, 2004). The approach of this project focused on facilitation through examination of exposure during formal education of nurse anesthetists to music as a CAM.

Literature Review

Search Method

A search of the CINAHL database was performed using the search terms *music*, *perioperative*, and *anesthesia*. This yielded 188 results. The search was then narrowed to the years 2010 to 2017 and articles in the English language which resulted in 25 available full text articles. An additional search was performed utilizing the terms *evidence based practice*, *anesthesia*, and *barriers*. Results again were narrowed to only include articles available in full text in the English language and did not include any alternative therapy besides music.

After a review of the article abstracts, 22 articles that included qualitative and quantitative original research as well as systematic reviews were read. An evidence based research table was created utilizing the most pertinent articles, and included the following

headings: author, year of publication, study goals, study design, sample size, sample data, data collection tools and methods, and summary of results. The table was organized in alphabetical order according to author. See Table 1: Evidence-based Table.

Music and the Perioperative Setting

The perioperative setting can be anxiety producing and the surgical procedures painful, leading to post-operative complications for patients. The number of different medication as well as the specific medications themselves routinely utilized in the treatment of anxiety and pain have side effects that may be adverse, may complicate an anesthetic plan, or are contraindicated in certain patient populations. Adjunctive treatments for anxiety and pain can be part of a solution towards reducing the amount of one specific medication, and number of different medications required for patients to have adequate pain control and reduce anxiety.

Music is one adjunctive therapy that has been shown across multiple studies to have the ability to reduce anxiety in various care settings. Measurements of anxiety across the reviewed studies were taken with multiple tools including: Spielberger state anxiety scale, global anxiety-visual analog score, state-trait anxiety inventory, and the hospital anxiety and depression scale were utilized with similar results making these results more compelling. Binns-Turner et al (2011) showed that music statistically reduced pain and anxiety scores for patients undergoing mastectomy. Similarly, Kahloul et al. (2016) found that patients who listened to music while under general anesthesia had a significant increase in patient satisfaction scores.

Music can be used across age groups as van der Heijden et al (2015) found after their study that focused on children produced similar results on pain and anxiety as had previously been found with adults. Bradley et al. (2015) focused on if live music had a different effect than recorded music. Results comparing live and recorded music showed that preoperative music

therapy, live or recorded, reduced anxiety more than standard preoperative management without music and that live music was slightly more beneficial (Bradley et al, 2015).

When comparing music to noise canceling headphones Johnson, Raymond, and Goss (2012) concluded that while noise canceling headphones had the greatest decrease in overall anxiety, patients who listened to music had the lowest post-operative anxiety scores. Trangeberg and Stromberg (2013) showed that patients had an overall positive feeling about their surgical experience and feelings of overall peace and well-being in addition to decreased anxiety with the addition of music.

Physiological Response to Music Therapy

Music does not simply reduce psychological factors such as anxiety and pain, it also has positive effects on hemodynamic stability. Binns-Turner et al (2011), Kahloul et al (2016), and Mohammadi et al. (2014) found that mean arterial pressures and overall hemodynamic stability were improved with utilization of music in the perioperative setting. What makes Binns-Turner et al (2011), Kahloul et al (2016), and Mohammadi et al. (2014) conclusions interesting is that they were not administering the music in the same portions of the perioperative time frame yet obtained similar results suggesting that the when of music administration is not as important as the overall inclusion of music as an adjunctive therapy.

Graverson and Sommer (2013) utilized laboratory testing to give patients' perceptions of anxiety and pain more weight through the use of cortisol levels drawn pre-operatively as well as two hours postoperatively. The decrease in cortisol levels was statistically significant in the immediate post-operative phase, interestingly reduction in pain and anxiety was not statistically significant until post-operative day number seven.

Broad inclusion of music therapy across patient care settings is an important adjunctive therapy to consider, which can offer improvement to both patient care and satisfaction. It is clear based on the current literature that inclusion of music therapy is versatile, positively impactful, and could be applied across care areas.

Method

Research design

An online descriptive survey was sent via email to current program directors of nurse anesthesia programs in the United States. This survey was a needs assessment looking at the current level of inclusion in nurse anesthetist programs regarding music as an adjunctive therapy to pain and anxiety. In addition to level of inclusion of music as an alternative medicine the needs assessment looked at what barriers may exist to its inclusion as a part of standard curriculum.

Sampling

There are 120 programs in the United States that offer a degree in nurse anesthesia at either a Masters or Doctoral level, all school were included in the sample size to gain the clearest picture of current practice as well as gain the largest response possible. The needs assessment was directed at program directors as they were most familiar with whom within their respective programs could best answer questions regarding alternative pain treatment education.

Instruments

The project survey asked multiple choice questions regarding school demographics as well as a needs assessment of multiple choice and open-ended questions about the current curriculum of CAM, and inclusion of music as an adjunctive therapy (appendix C).

Demographic information included: length of program, degree offered, and size of program.

Needs assessment questions included what current curriculum for non-pharmacological methods

of treatment of pain and anxiety and if the director is aware of the benefits of such therapies. Additionally, if music was not a part of curriculum would program directors consider adding music and what are the perceived barriers to this kind of additional course work.

Ethical consideration

Approval from the DePaul University institutional review board was obtained September 1, 2017. There were no physical or psychological risks associated with this project. The survey was anonymous, confidential, and voluntary. Potential participants received a recruitment email (appendix A) containing an attached information sheet (appendix B) to ensure they were aware of the voluntary and anonymous nature of the survey. Participants were informed that review of the information sheet, continuation to and completion survey link served as their voluntary agreement to participate.

Data Collection Procedure

Email addresses for school contacts were obtained through the Council on Accreditation website. A recruitment email (appendix A) was sent by one of my committee members and contained an attached information sheet (appendix B) as well as a secure link to the survey (appendix C) via depaul.qualtrics.com. The survey was developed by the investigator and asked questions regarding demographics of each program, current CAM education practices, current awareness of CAM, and potential interest and barriers to implementation of CAM materials into curriculum. The survey required about 10 minutes of the participants' time. Those who voluntarily completed the anonymous and confidential survey were included in the research.

Data Analysis

All raw data from surveys were downloaded from Qualtrics and then uploaded to the Statistical Package for the Social Sciences software version 24 (SPSS) program. The SPSS was used to analyze the collected data with demographic variables and identify key themes from open

ended responses being entered into SPSS descriptive statistics to determine frequencies, mean and standard deviation.

Results

Description of Sample

Twenty-eight participants responded to the survey. One survey was left completely blank and as a result was deleted leaving twenty-seven respondents (n= 27). Programs who responded included: 9 MSN, 7 DNAP, 9 DNP and 2 programs who did not answer. Twenty-three of the programs were 25-36 months, 2 programs were less than 25 months and 2 were more than 36 months.

Annual number to students admitted per program breakdown was as follows: 8 with fifteen or less, 8 with sixteen to twenty-five, 9 with twenty-six to thirty-five, and 2 with more than thirty-five. For analysis purposes this group was simplified to programs who accept up to twenty-five students and programs who accept greater than twenty-five students per year.

Music Inclusion into Nurse Anesthesia Programs as a CAM

To address the clinical question regarding routine inclusion of music into current curriculum subjects were asked whether or not CAM was currently a part in their program. Eleven of the twenty-seven program respondents included some kind of CAM education. CAM content was included in the following courses: acute and chronic pain, anesthesia principles, pharmacology, professional aspects, clinical correlation conference, and advanced topics in nurse anesthesia. CAM content specifically included: acupuncture/acupressure, hypnosis, meditation, herbals, guided imagery, yoga, hiking, and music. It should also be noted, some respondent programs utilized multiples types of CAM in their curriculum.

When asked directly about music in curriculum as a CAM, 4 of the 9 respondents currently included CAM. Of the responses to adding music as a CAM, 9 respondents would

consider adding music to their curriculum, 2 already included it, and 6 were opposed to the addition. Reasons given for opposition were lack of wide acceptance in the medical community, time constraints, lack of NBCRNA content, and a feeling of impracticality of implementation in the clinical setting. Time constraints, was the most often noted barrier for addition of music as CAM to curriculum. Programs currently including music as CAM, showed no statistically significant difference in program length, degree level, or annual number of students admitted.

The question of, if respondents were aware of the advantages of music as a CAM, was not statistically significant when viewed with the three different degree categories. When looking at the data by a more simplistic degree breakdown, between masters and doctoral tracks it was found to be statistical significance of ($p = 0.003$), demonstrating doctoral track programs were more likely to appreciate the benefits of music therapy to patient outcomes.

Discussion

This study assessed the current inclusion of, attitudes towards, and barriers for inclusion of music as a CAM in CRNA curriculum. The respondents of the survey were program directors or their proxy of accredited CRNA within the United States. There were no other studies on this topic found in the literature with which to compare this project's results.

The results of this survey indicated that programs at a doctoral level were more likely to know about the benefits of music use as CAM for patients when compared to master's level programs. This was the only statistically significant finding from the survey. Interestingly this did not translate into a significant difference in more doctoral programs inclusion of music as a CAM into curriculum.

A sample syllabus (appendix E) was created and incorporated the knowledge and attitude deficits noted above. The development of this educational recommendation fell into the facilitation portion of the conceptual framework for this project. Future implementation of this

educational piece is also a part of the facilitation phase. Future implementation is dependent upon receptiveness of students and practicing CRNAs could result in better patient experiences with less anxiety and better pain control, while also utilizing less pharmacologic intervention.

Limitations

One limitation of this project is the small response rate, 22.5% of the total sample size responded to and filled out the survey. With this smaller sample size, it is difficult to judge if this data is accurate for all CRNA programs. Additionally, practicing CRNAs were not included to identify their respective programs discussed music as a CAM, or if they utilize this method in their own practice.

Future Recommendation

The results of the needs assessment survey show that there is an inconsistency between CRNA programs within the United States regarding music as a CAM education due to lack of knowledge regarding benefits, time constraints, and lack of inclusion on the NBCRNA examination. With current drug shortages, and a national focus on reduction in opiate usage, it is important that all practitioners are knowledgeable regarding alternative modalities of pain and anxiety reduction. A sample syllabus, incorporating music as CAM, was developed as a response to this research review and the above issues. (appendix E).

Key elements of the proposed curriculum addition (appendix E) include but are not limited to: benefits of music as a CAM, appropriate patient selection, and appropriate music selection. In order for students and practitioners to be willing to change their current practice, they must first understand the benefits of the addition of music. It is equally important for students and practitioners to have the ability to choose appropriate patients to utilize music as a CAM. While research suggests there is no wrong patient choice, it is important to keep in mind music effects and the procedure being performed. For example, if there is neuro monitoring

involved such as EEG, music may be a poor choice intraoperatively due to possible increases in brain wave activity coinciding with musical changes, but may be a good choice during pre-operative, induction, wake up, and post-operative phases. Music selection is equally important as patient selection.

For currently practicing CRNAs in addition to an introductory course as suggested above, working in conjunction with hospital music therapy department to create a variety of appropriate music selections and playlists for patients to choose from. Additionally, creating a policy or protocol for inclusion of music as a CAM for specific patient groups or surgical procedures may be helpful to all staff during implementation.

Conclusion

Literature has clearly and consistently shown use of music as a CAM can supplement traditional anxiolysis and analgesic treatments as well as improve patient outcomes. The findings of this project demonstrate that music as a CAM education lacks consistency. This project showed that there are CRNA programs that know the benefits of and have found ways to integrate music as a CAM into their curriculum. The results of this project also showed there is a need to expand music as a CAM education for both students, and current practitioners to increase awareness of benefits as well as appropriate utilization. Addition of music as a CAM to current curriculum has the potential to increase knowledge for students, as well as current practitioners regarding the benefits and ways to incorporate music as a CAM into practice, and is a positive first step towards acceptance and inclusion into practice. With education and increased awareness of music as a CAM, in time, the current gap between research and practice will lessen, giving practitioners more tools to utilize in their everyday practice.

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Table 1

Author and year	Study Objectives	Methods (Design, Sample Size, Setting, Human Subjects Issues)	Study Variables or Constructs Measured or Variables Controlled for by Researchers	Instruments Used to Measure the Construct/s	Statistics used for data analysis	Study Findings	Conclusion
Binns-Turner, Wilson, Pryor, Boyd, and Prikett, (2011)	Evaluate the effects of a perioperative music intervention provided continuously throughout the preoperative, intraoperative and postoperative periods	Quasi-experimental 30 women undergoing mastectomy after breast cancer diagnosis split into intervention and control groups Urban hospital in western Tennessee	Mean arterial pressure (MAP), heart rate, anxiety, and pain Exclusion of ASA 4 & 5, previous breast cancer diagnosis and treatment, chronic obstructive pulmonary disease, mental disorders, use of antipsychotic and benzodiazepine medications, inability	MAP-automated noninvasive blood pressure monitoring instrument with an accuracy of ± 5 mm Hg Heart rate-automated electrocardiograph with an accuracy of ± 5 points Anxiety-Spielberger state anxiety scale (SAI) Pain-Visual analogue scale	SPSS version 15.0 Independent t test for continuous variables and comparison of change scores for main study outcomes Chi ² for categorical variables P value of 0.05 considered	Chi ² - no significant differences at baseline between intervention and control group Independent t test- no differences between intervention and control groups in baseline measurements of MAP, heart rate,	MAP, pain, and anxiety all had significant reductions with music intervention compared to the control group. Consistent with similar studies

			<p>to receive midazolam, and use of hearing aids.</p> <p>Patient selection from one of five genres of music</p> <p>Music choice contained four hours of continuous and non-repeating</p> <p>Max volume on iPod locked at 70dB</p> <p>Post-operative survey not given until Aldrete score of 9</p>		significant	<p>anxiety, and pain</p> <p>MAP- P=0.003</p> <p>Heart rate- P=0.248</p> <p>Anxiety- P=<0.001</p> <p>Pain- P=0.007</p>	
Bradley Palmer, Lane, Mayo, Schluchter, and Leeming (2015)	Investigate the effect of live and recorded perioperative music therapy on anesthesia	<p>Three-group randomized control trial</p> <p>207 female patients undergoing surgery for</p>	<p>Amount of propofol needed to reach a BIS of 70</p> <p>Time spent in the post anesthesia care unit</p>	<p>BIS monitor</p> <p>Global anxiety-visual analog score</p> <p>Time to discharge readiness</p>	<p>P value</p> <p>Standard deviation</p>	<p>Propofol p= 0.17 vs 0.11</p> <p>Anxiety p< 0.001</p> <p>Time in PACU p= 0.018 between</p>	Preoperative music therapy reduced anxiety significantly more than usual preoperative

	require ments, anxiety levels, recovery time, and patient satisfact ion in women experien cing surgery for diagnosi s or treatmen t of breast cancer.	potential or known breast cancer under Monitored anesthesia care cases	Anxiety and patient satisfaction Live music vs recorded music	Consumer Assessment of Health Providers and Systems		music groups	managem ent No changes in satisfacti on, sedation requirem ents, or readiness for discharge .
Funk et al (1991)	Why growth of amount of nursing research has far out stripped the amount of research being utilized as well amount of time it takes for entry to practice	Random sample of 5000 from the American Nursing Associatio n 1000 from each level of education (diploma, associates, baccalaure ate, master's and doctorate) 22 states 1989 response	Retired members not included in final sample	Barriers scale creation	Cronbac h's alpha	Nurse- 0.80 Settings- 0.80 Researc h factors- 0.72	Previousl y unable to assess the reason for lag n research utilizatio n due to lack of reliable tool. Barriers tool is soundly based and reliable tool

		rate- final sample of 1948					
Gravers en and Somme r (2013)	Evaluate the impact of soft music on post- operativ e pain, nausea, fatigue, and surgical stress	Randomiz ed clinical trial 75 patients undergoi ng laparosc pic cholecyste ctomy as day surgery Danish day surgery	Pain, nausea, and fatigue measured at baseline pre-op and 1h, 3h, 1 day, and 7 days post op C-reactive protein and cortisol pre-op and 2h post-op Music administere d via Musicure placed behind patients' head before surgery and used until discharge home Similar amounts of anesthetic, fluid, and morphine administere d to all patients	Visual Analogue Scale Numerical rating scale Laboratory test data	Mann- Whitney rank- sum test Types 1 & 2 errors of 0.05 ad 0.20 to evaluate pain, fatigue, nausea, cortisol and CRP levels Chi ² for dichoto mized data P values <0.05 consider ed statistic ally significa nt Statistic al analyses preform ed in STATA	Pain 1h p= 0.927 3h p=0.207 1d p=0.542 7d p=0.014 Fatigue 1h p=0.115 3h p=0.632 1d p=0.042 7d p=0.015 Nausea 1h p=0.809 3h p=0.950 1d p=0.817 7d p=0.150 Cortisol levels p< 0.001 c- reactive protein levels	Music may affect surgical stress and decrease in fatigue and later pain
Johnso n, Raymo nd, and	Effect of music verses use of	Experime ntal three- group design	Anxiety pre and post	State Trait Anxiety inventory	PASW statistics 17	Subjects with preop	Noise canceling headphon es had

Goss (2012)	noise-blocking headphones on anxiety levels in women undergoing SDS for gynecologic procedures	with pre and post measurement of anxiety 119 women	intervention Participants came from only the women's surgical center Three types of music available	Rapid assessment anxiety tool	P value	anxiety p=0.04	greatest overall change in anxiety Music had the lowest post-operative anxiety scores
Kahloul et al. (2016)	Evaluate the effects of music under general anesthesia on perioperative patient satisfaction, stress, pain, and awareness	Prospective randomized double blind study 140 patients split into two comparable demographic groups, surgical type, and anesthesia duration Sahloul Teaching Hospital over 4 months	Hemodynamic parameters, quality of arousal, pain, patient satisfaction, awareness incidence during anesthesia Patient selected music from predetermined options	Visual Analogue Scale (VAS) Riker score for calm recovery	SPSS analysis with Chi ² and ANOVA Significance level set at 0.05	Riker p < 0.01 VAS p < 0.01 Satisfaction p < 0.01	Intervention group had more stable hemodynamic profile for systolic BP Significantly high satisfaction rate for intervention group Less intraoperative awareness but not statistically significant

Moham madi et al. (2014)	Evaluate the effects of music on preopera tive state anxiety and physiolo gical paramet ers	Randomiz ed quasi- experimen tal 60 general surgery patients Shahid Beheshti hospital, Kashan City, Iran	Anxiety, heart rate, respiratory rate, blood pressure Music type was classical, non-vocal with nature sounds Hemodyna mically stable, not currently taking anxiolytic medication, fully awake, literate and no prior surgical history, and an anxiety score higher than 20 undergoing general surgery	State-trait Anxiety Inventory (STAI) Vitals measured by CO- oximeter and recorded in medical charts by nurses.	SPSS analysis with Chi ² t-tests with significa nce level of 0.95 p value	Anxiety: p=0.002 HR: p=0.11 RR: p=0.32 MAP: p=0.13	Music can successfu lly be used as a non- invasive therapeuti c interventi on significan t decrease in anxiety before and after music interventi on statistical decrease in mean arterial BP
Paraho o (2000)	Reports findings from large survey looking at the perceive d extent of research utilizati	2600 questionn aires distributed to 23 hospitals in Northern Ireland	Multiple clinical settings and all levels of practice included	Barriers Scale	SPSS Manual data analysis Cronbac h's alpha coeffici ents for	Setting alpha- 0.8957 Presenta tion alpha- 0.8368 Nurse alpha- 0.8892	top two barriers: does not feel they have enough authority and statistical analyses are not

	on and other research related activities	1368 respondents			subscales	Research alpha-0.8565	understandable. Role of management is a top facilitator if research utilization
Tranberg and Stromberg (2013)	Determine the effect of a music intervention on patients' mood and self-reported satisfaction	Multi-modal-open-ended interview and quantitative anxiety scale 15 patients age 21-73 undergoing elective procedure	Anxiety and depression procedure lasting 1-3 hours with an axillary nerve block with no disease or medication that would prevent accurate accounts of the experience	Hospital Anxiety and Depression scale	P value	Anxiety p= 0.019	patients felt overall positive experience several reporting feelings of peace and well-being during the procedure ability to disengage from the procedure itself

van der Heijden, Araghi, van Dijk, Jeekel, and Hunink (2015)	- Examine the effects of music interventions on pain, anxiety and distress on children undergoing invasive surgery	Systematic review and meta-analysis 196 orthopedic, cardiac, and day surgery patients Aged 1 day -18 years old	Pain and anxiety and distress Control group for included studies could not have any adjunctive therapy	Pain: Visual analogue scale, coloured analogue scale and facial pain scale Anxiety and distress: emotional index scale, Spielberger short state trait anxiety inventory, and facial affective scale	Chi ² I ² P value Standardized mean difference	Pain: Chi ² 22.11 I ² = 91% P < 0.0001 Standardized mean difference of -1.07 between intervention and control group favored music Anxiety: Chi ² 0.18 I ² = 0% P = 0.67 Standardized mean difference was -0.34	Overall statistically significant positive effects on post-operative pain and on anxiety and distress in children
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Appendix A

Dear Program Director,

Hello. My name is Taylor Hull SRNA and I am a DNP student enrolled in NorthShore University HealthSystem School of Nurse Anesthesia and DePaul University School of Nursing. I am conducting a research study for my Doctorate of Nursing Practice. I am writing to invite you to participate in my research study about the use of music as an adjunctive measure for analgesia and anxiolysis.

Inclusion criteria for this study is as follows: the current program director, or their proxy of the current faculty most knowledgeable about current pain curriculum, of an accredited nurse anesthesia program within the United States.

If you agree to be in this study, you will be asked to complete a survey, with questions pertaining to the use of music as a part of your complementary and alternative medicine (CAM) curriculum. You will be provided a link for the survey via email through a secure website <http://depaul.qualtrics.com>. The link will be available for a limited time and the survey should take about 10 minutes to complete.

Your participation is voluntary and you have the right to withdraw at any time without consequence. If you change your mind later while answering the survey, you may simply exit the survey and there will be no negative consequences.

Your responses will be completely anonymous and will only be used for this study by the researcher. By completing and submitting the survey, you are indicating your agreement to be in the research.

Please see the attached Information Sheet for more information. Thank you very much.

Sincerely,
Taylor Hull
hulltj@hotmail.com
563-343-7665

Appendix B

INFORMATION SHEET FOR PARTICIPATION IN RESEARCH STUDY

Current nurse anesthesia education practice regarding music as an adjunctive for analgesia and anxiolysis

Principal Investigator: Taylor Hull, RN Nurse Anesthesia Trainee

Institution: DePaul University, Chicago, IL, USA and NorthShore University Health System, Evanston, IL, USA

Faculty Advisor: Karen Kapanke, CRNA, DNP, NorthShore University Health System

Research Team: Pamela Schwartz, CRNA, DNP NorthShore University Health System

Collaborators:

I am Taylor Hull, a student nurse anesthetist at NorthShore University Health System School of Nurse Anesthesia. I am conducting a research for my Doctorate of Nursing Practice through DePaul University under the supervision of committee chair Dr. Karen Kapanke, faculty at NorthShore University Health System School of Nurse Anesthesia.

I am conducting a research study to learn more about if and how music as adjunctive therapy for pain and anxiety is included in your curriculum. The purpose of this study is to find the following:

- Is music routinely included into nurse anesthesia programs as a complementary and alternative medicine (CAM) for pain and anxiety?
- How can music become a part of nurse anesthesia curriculum?
- What barriers exist to music inclusion into nurse anesthesia programs?

My goal is to use my findings to see if there is gap between the research and education or research and application and create an educational tool to bridge any gap that is found.

I am requesting your participation in the research because you are a current program director, or their proxy of the current faculty most knowledgeable about current pain curriculum, of an accredited nurse anesthesia

program within the United States. If you agree to participate in this study, you will be asked to complete a survey. You will be provided a link via email through a secure website www.depaul.qualtric.com. The link will be available for a limited time.

Survey participation will take approximately 10 minutes of your time. The survey will include questions regarding demographic information such as what degree level your program offers and length of program. In addition, the survey asks questions regarding current pain and anxiety curriculum, perception of inclusion, and barriers to inclusion of adjunctive therapy including music into curriculum.

Your participation is voluntary and you have the right to withdraw at any time without penalty. If you change your mind later while answering the survey, you may simply exit the survey and there will be no negative consequences. You also have the option to skip a question if you do not feel like answering.

Your responses will be completely anonymous and will only be used for this study by the researcher. No IP addresses will be collected. Data will be secured on a password protected computer and deleted upon my completion of the graduate program. Completion and submission of the survey will serve as your voluntary agreement to participate in the study.

If you have questions, concerns, or complaints about this study or you want to get additional information or provide input about this research, please contact the researcher, Taylor Hull, at hulltj@hotmail.com or 563-343-7665 or Dr. Karen Kapanke, at kkapanke@northshore.org.

If you have questions about your rights as a research subject, you may contact Susan Loess-Perez, DePaul University's Director of Research Compliance, in the Office of Research Services at 312-362-7593 or by email at sloesspe@depaul.edu. You may also contact DePaul's Office of Research Services if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.

You may keep this information for your records.

Thank you for your consideration and cooperation.

Appendix C

Survey

Demographic Information

1. What degree level does your program offer?
 - a. MSN
 - b. DNAP
 - c. DNP
2. How long is your program of study?
 - a. 12-24 months
 - b. 24-36 months
 - c. Greater than 36 months
3. How many students are accepted into your program annually?
 - a. 15 or less
 - b. 16-25
 - c. 26-35
 - d. Greater than 35

Needs Assessment

4. How does your programs current curriculum incorporate complementary and alternative medicine (CAM) for pain and anxiety? If there is no current inclusion of CAM in curriculum, please proceed to question 10.

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5. Which specific nursing and/or anesthesia courses include CAM? What are the CAM course objectives?

6. Which areas are included in the CAM curriculum?

- a. music
- b. guided imagery/meditation
- c. aromatherapy
- d. acupuncture/acupressure
- e. other

7. How is the CAM curriculum taught?

- a. lecture
- b. self-study module
- c. other

8. How do you measure outcomes of CAM curriculum?

- a. exam
- b. simulation/demonstration
- c. other

9. Is music included in your CAM curriculum, if so how?

10. Are you aware of the uses of and benefits to providing music in the perioperative setting?

a. yes

b. no

11. Would you be interested in the addition of music as an adjunctive therapy into your current curriculum? Why or why not?

12. Are there any barriers to implementation of music as an adjunctive therapy into your current curriculum? What are the barriers?

Appendix D

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2 COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Taylor Hull (ID: 6261443)
- **Institution Affiliation:** DePaul University (ID: 1435)
- **Institution Email:** hulltj@hotmail.com
- **Phone:** 5633437665
- **Curriculum Group:** Students
- **Course Learner Group:** Students - Class projects
- **Stage:** Stage 1 - Basic Course
- **Record ID:** 22773821
- **Completion Date:** 31-Mar-2017
- **Expiration Date:** 30-Mar-2020
- **Minimum Passing:** 80
- **Reported Score*:** 88

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
History and Ethical Principles - SBE (ID: 490)	31-Mar-2017	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	31-Mar-2017	4/5 (80%)
The Federal Regulations - SBE (ID: 502)	31-Mar-2017	4/5 (80%)
Assessing Risk - SBE (ID: 503)	31-Mar-2017	5/5 (100%)
Informed Consent - SBE (ID: 504)	31-Mar-2017	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	31-Mar-2017	5/5 (100%)
Students in Research (ID: 1321)	31-Mar-2017	3/5 (60%)
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	31-Mar-2017	4/5 (80%)
DePaul University (ID: 12952)	31-Mar-2017	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k2020e89b-32ee-482a-a651-caca2eb4df5d-22773821

Collaborative Institutional Training Initiative (CITI Program)

Email: support@citiprogram.org

Phone: 888-529-5929

Web: <https://www.citiprogram.org>

Appendix E

Course Description: A course will discuss the history of music use in the field of medicine and current research regarding use. The course will provide insight in to patient selection and benefits of utilization for music as a complementary and alternative medicine by the anesthesia provider.

Objectives: At the completion of this course, the nurse anesthetist trainee will be able to:

1. Describe the benefits of music as a CAM for patients.
2. Describe patient population selection for music as a CAM.
3. Demonstrate appropriate music for as a CAM choice.
4. Describe utilization for anesthesia of music as a CAM

Teaching/Learning Strategies: Lecture, audio-visual materials, class discussion and simulation

Course Outline:

- I. Historical music as CAM use
- II. Music in modern medicine
- III. Patient populations and music as CAM utilization
- IV. Music selection
- V. Integration and utilization of music as CAM for anesthesia